

Claims

We claim:

1. A memory storage device comprising:

5 a) a storage cell comprising a changeable magnetic region, said changeable magnetic region comprising a material having a magnetization state that is responsive to a change in temperature thereof; and

b) a heating element proximate to said storage cell for selectively changing the temperature of said changeable magnetic region of said storage cell.

10 2. The memory storage device of claim 1, wherein said storage cell comprises a magnetic tunnel junction.

3. The memory storage device of claim 1, wherein said changeable magnetic region is a reversible magnetic region having a magnetization state which can be reversed by applying thereto a selected magnetic field, said reversible magnetic region comprising a material having a magnetization state that is responsive to a change in the temperature thereof.

15 4. The memory storage device of claim 3, wherein said storage cell further comprises at least one fixed magnetic region having a magnetization state which does not reverse when said selected magnetic field is applied thereto.

5. The memory storage device of claim 1, wherein said heating element is heated by passing an electric current therethrough.

20 6. The memory storage device of claim 5, further comprising an electrically conductive terminal capable of receiving the electric current passing through said heating element.

7. The memory storage device of claim 1, wherein said material having a magnetization state that is responsive to a change in temperature thereof comprises a ferrimagnetic material.

5 8. The memory storage device of claim 7, wherein said changeable magnetic region is maintained at a compensation temperature of said material to maintain stored data in said storage cell.

9. A memory storage device comprising:

10 a) a storage cell comprising a changeable magnetic region, said changeable magnetic region comprising a material having a magnetization state that is responsive to a change in temperature thereof; and

b) a heating element responsive to an external energy source and proximate to said storage cell for selectively changing the temperature of said changeable magnetic region of said storage cell.

15 10. A memory array comprising two or more memory storage devices, at least one of said memory storage devices comprising:

a) a storage cell having a bit line and word line associated therewith, said storage cell comprising a changeable magnetic region, said changeable magnetic region comprising a material having a magnetization state that is responsive to a change in temperature thereof; and

20 b) a heating element proximate to said storage cell for selectively changing the temperature of said changeable magnetic region of said storage cell.

11. The memory array of claim 10, wherein said storage cell comprises a magnetic tunnel junction.

12. The memory array of claim 10, wherein said changeable magnetic region is a reversible magnetic region having a magnetization state which can be reversed by applying

thereto a selected magnetic field, said reversible magnetic region comprising a material having a magnetization state that is responsive to a change in temperature thereof.

5 13. The memory array of claim 12, wherein said storage cell further comprises at least one fixed magnetic region having a magnetization state which does not reverse when said selected magnetic field is applied thereto.

 14. The memory array of claim 10, wherein said heating element is heated by passing an electric current therethrough.

10 15. The memory array of claim 14, wherein said at least one of said memory storage devices further comprises an electrically conductive terminal capable of receiving the electric current passing through said heating element.

15 16. The memory array of claim 14, wherein said electric current is passed through said heating element for a predetermined time period, wherein said time period is sufficiently short so as to prevent reversal of a magnetization state of one or more storage cells adjacent to the selected storage cell.

 17. The memory array of claim 10, wherein said material having a magnetization state that is responsive to a change in temperature thereof comprises a ferrimagnetic material.

20 18. The memory array of claim 10, wherein said changeable magnetic region is maintained at a compensation temperature of said material to maintain stored data in said storage cell.

19. An integrated circuit comprising at least one memory storage device, said memory storage device comprising:

a) a storage cell comprising a changeable magnetic region, said changeable magnetic region comprising a material having a magnetization state that is responsive to a change in temperature thereof; and

b) a heating element proximate to said storage cell for selectively changing the temperature of said changeable magnetic region of said storage cell.

20. The integrated circuit of claim 19, wherein said at least one memory storage device further comprises an electrically conductive terminal capable of receiving an electric current passing through said heating element.